Remarks

A. Pending Claims

Claims 4184-4224 and 4242-4280 are currently pending. Claims 4197, 4203, 4218, 4255, and 4272 have been amended.

B. Request for Signed Information Disclosure Statements

Applicant respectfully requests signed, initialed copies of the enclosed unacknowledged electronic Information Disclosure Statements. The statements include: U.S. Patent Documents citation numbers 1-2 sent on and received by the PTO on June 23, 2003, as indicated on the enclosed acknowledgement receipt EFS ID 42314; U.S. Patent Documents citation numbers 1-7 sent on and received by the PTO on August 22, 2003, as indicated on the enclosed acknowledgement receipt EFS ID 46348; U.S. Patent Documents citation numbers 1-17 sent on and received by the PTO on September 16, 2004, as indicated on the enclosed acknowledgement receipt EFS ID 68651; U.S. Patent Documents citation numbers 1-6 and U.S. Published Applications citation numbers 1-2 sent on and received by the PTO on September 28, 2004, as indicated on the enclosed acknowledgement receipt EFS ID 69373; and U.S. Patent Documents citation numbers 1-6 sent on and received by the PTO on November 1, 2004, as indicated on the enclosed acknowledgement receipt EFS ID 71588. Applicant also respectfully requests signed, initialed copies of the enclosed unacknowledged Forms PTO-1449 including: reference numbers GOA-01 through GOA-05, received on the PTO on August 5, 2004; and reference numbers SOAC-01 and NOA-01, mailed on November 16, 2004 and received by the PTO on November 18, 2004, as indicated on the enclosed return receipt post card.

C. Submission of Replacement Sheets

In the Office Action mailed December 20, 2004, the Examiner indicated approval of the proposed drawing corrections mailed on February 25, 2002. Applicant submits the formal

drawings approved by the Examiner (7 sheets of drawings including FIGS. 23a, 23b, 32, 44, 54, 55, 59, 60, and 63) as an attachment following page 21 of this paper.

D. The Claims Are Neither Anticipated By, Nor Obvious Over Terry Pursuant To 35 U.S.C. §102(b) or 35 U.S.C. §103(a), Respectively

Claims 4187-4224 and 4242-4280 were rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 4,099,567 to Terry (hereinafter "Terry"). Applicant respectfully disagrees with these rejections.

The standard for "anticipation" is one of fairly strict identity. To anticipate a claim of a patent, a single prior source must contain all the claimed essential elements. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q.81, 91 (Fed. Cir. 1986); *In re Donahue*, 766 F.2d 531,226 U.S.P.Q. 619,621 (Fed. Cir. 1985).

In order to reject a claim as obvious, the Examiner has the burden of establishing a *prima facie* case of obviousness. *In re Warner et al.*, 379 F.2d 1011, 154 U.S.P.Q. 173, 177-178 (C.C.P.A. 1967). To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP § 2143.03.

The Office Action states:

> Terry...teaches a product produced from a coal formation comprising cracked gases of pyrolysis. The product reasonably appears to be either the same as or an obvious variation of the instantly claimed product because the product of Terry is also produced from a coal formation and in a similar way as compared to the claimed product. See column 2, lines 54-68 and column 5, lines 38-44 of Terry.
>
> In the event any difference can be shown for the product of claims 4184-4224 and 4242-4280, as opposed to the product taught by Terry, such differences would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results.

Applicant submits that the product of Terry is not produced in a similar way as compared to the claimed product. Terry appears to use a flame front to heat the coal formation. For example, Terry states:

> The hot channels in the underground coal are then used to propagate in situ combustion of the coal. Combustion is sustained by continuous injection of oxygen and combustion temperatures are moderated by continuous injection of steam.
> (Terry, col. 2, lines 64-67)

> By injecting oxygen into well 23 and upon oxygen break-through at well 24, the coal can be ignited in well 24 and in time a channel can be burned between and linking the wells.
> (Terry, col. 3, lines 64-67)

> Coal abutting on the linkage channel will be at a temperature well above its ignition point temperature and will readily burn upon resumption of oxygen injection through the circuit.
> (Terry, col. 4, lines 45-49)

> The length of channel 16 has a direct bearing on the conversion of pyrolysis gases, therefore if it is desirable to have the gases of pyrolysis uneffected in part channel 16 must be long enough, for example 300 feet, so that a portion of the pyrolysis gases will not be subject to cracking temperatures.
> (Terry, col. 5, lines 6-11)

> Residual heat in the coal, the ash from the coal and the surrounding overburden may be recovered by the continued injection of water.
> (Terry, col. 5, lines 54-56)

Applicant's Specification, however, describes heating the coal formation with heat sources and heaters. Applicant submits that it is not obvious to one of ordinary skill in the art that products obtained from a coal formation heated with a flame front would be the same as or an obvious variation of the claimed product. Applicant's Specification states:

> In addition, it is believed that operating at high pressure and a pyrolysis

temperature at the lower end of the pyrolysis zone tends to decrease the fraction of fluids with carbon numbers greater than 25 produced from the coal.

It is believed that lower temperatures and/or increased partial pressure of hydrogen in the coal formation will tend to produce less olefins in the produced hydrocarbon fluids. In addition, lower temperatures and/or higher partial pressures of hydrogen also tend to increase the atomic hydrogen to atomic carbon ratio in the produced hydrocarbon fluids.

It is believed that at higher pyrolysis temperatures production of oil liquids tends to be higher than at the lower pyrolysis temperatures. In addition, high pressures tend to decrease the quantity of oil liquids produced from a coal formation. Operating an in situ conversion process at low pressures and high temperatures may produce a higher quantity of oil liquids than operating at low temperatures and high pressures.
(Specification, p. 117, line 26 through p. 118, line 9)

In an embodiment, a pressure within a heated portion of the formation may surprisingly increase the quality of relatively high quality pyrolyzation fluids, the quantity of relatively high quality pyrolyzation fluids, and/or vapor phase transport of the pyrolyzation fluids within the formation. Increasing the pressure often permits production of lower molecular weight hydrocarbons since such lower molecular weight hydrocarbons will more readily transport in the vapor phase in the formation. Generation of lower molecular weight hydrocarbons (and corresponding increased vapor phase transport) is believed to be due, in part, to autogenous generation and reaction of hydrogen within a portion of the coal formation. For example, maintaining an increased pressure may force hydrogen generated in the heated portion into a liquid phase (e.g. by dissolving). In addition, heating the portion to a temperature within a pyrolysis temperature range may pyrolyze at least some of the hydrocarbons within the formation to generate pyrolyzation fluids in the liquid phase. The generated components may include a double bond and/or a radical. H_2 in the liquid phase may reduce the double bond of the generated pyrolyzation fluids, thereby reducing a potential for polymerization of the generated pyrolyzation fluids. In addition, hydrogen may also neutralize radicals in the generated pyrolyzation fluids. Therefore, H_2 in the liquid phase may substantially inhibit the generated pyrolyzation fluids from reacting with each other and/or with other compounds in the formation. In this manner, shorter chain hydrocarbons may enter the vapor phase and may be produced from the formation.

Increasing the formation pressure to increase the amount of pyrolyzation fluids in the vapor phase may significantly reduce the potential for coking within the selected section of the formation. A coking reaction may occur in the liquid phase. Since many of the generated components may be transformed into short chain hydrocarbons and may enter the vapor phase, coking within the selected section may decrease.

Increasing the formation pressure to increase the amount of

pyrolyzation fluids in the vapor phase is also beneficial because doing so permits increased recovery of lighter (and relatively high quality) pyrolyzation fluids. In general, pyrolyzation fluids are more quickly produced, with less residuals, when such fluids are in the vapor phase rather than in the liquid phase. Undesirable polymerization reactions also tend to occur more frequently when the pyrolyzation fluids are in the liquid phase instead of the vapor phase. In addition, when pyrolyzation fluids are produced in the vapor phase, fewer production wells/area are needed, thereby reducing project costs.
(Specification, p. 119, line 18 through p. 120, line 20)

A temperature of at least a portion of a formation that is used to generate synthesis gas may be raised to a synthesis gas generating temperature (e.g., between about 400 °C and about 1200 °C). In some embodiments composition of produced synthesis gas may be affected by formation temperature, by the temperature of the formation adjacent to synthesis gas production wells, and/or by residence time of the synthesis gas components. A relatively low synthesis gas generation temperature may produce a synthesis gas having a high H_2 to CO ratio, but the produced synthesis gas may also include a large portion of other gases such as water, CO_2, and methane. A relatively high formation temperature may produce a synthesis gas having a H_2 to CO ratio that approaches 1, and the stream may include mostly (and in some cases substantially only) H_2 and CO. If the synthesis gas generating fluid is substantially pure steam, then the H_2 to CO ratio may approach 1 at relatively high temperatures. At a formation temperature of about 700 °C, the formation may produce a synthesis gas with a H_2 to CO ratio of about 2 at a certain pressure. The composition of the synthesis gas tends to depend on the nature of the synthesis gas generating fluid.
(Specification, p. 140, lines 11-24)

At relatively low pressures, and temperatures below about 400 °C, synthesis gas reactions are relatively slow. At relatively low pressures, and temperatures between about 400 °C and about 700 °C, Reaction (2) tends to be the predominate reaction and the synthesis gas composition is primarily hydrogen and carbon dioxide. At relatively low pressures, and temperatures greater than about 700 °C, Reaction (1) tends to be the predominate reaction and the synthesis gas composition is primarily hydrogen and carbon monoxide.
(Specification, p. 145, lines 25-30)

Concerning products obtained, Terry states: "The resulting product gas delivered to the surface via well 13 will be a composite gas composed primarily of hydrogen, carbon monoxide,

cracked gases of pyrolysis, uncracked gases of pyrolysis and hydrogen sulfide." (Terry, col. 5, lines 37-40) Applicant respectfully requests the Examiner to provide a basis for the statement that "the product appears to be either the same as or an obvious variation of the instantly claimed product". Otherwise, Applicant respectfully requests removal of the rejection of claims 4184-4224 and 4242-4280.

E. 35 U.S.C. §112 Rejections

Claims 4184-4224 and 4242-4280 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Applicant respectfully disagrees with these rejections.

The Office Action states:

> The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.
>
> To the extent it could be argued that the claimed composition is novel or unobvious, the claimed subject matter has not be[en] described in the specification in such a way as to enable one skilled in the art to make and/or use the invention, i.e., hydrocarbon formations differ in chemical composition and applicants have not identified the chemical characteristics of the hydrocarbon formation from which the claimed product is derived.

Applicant submits that suitable hydrocarbon formations are described at least from line 26 of page 41 through line 29 of page 45 of the Specification. Applicant respectfully requests removal of the rejection of claims 4184-4224 and 4242-4280.

F. Double Patenting Rejections

Claims 4184-4224 and 4242-4280 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 4184-4224 and 4369-4402 of copending Application No. 09/841,240. Claims 4184-4224 and 4242-4280 were

provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 4167-4183 and 4321-4342 of copending Application No. 09/841,636. Claims 4184-4224 and 4242-4280 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 4188-4284 of copending Application No. 09/841,310. Applicant does not believe that a terminal disclaimer is needed for the present application and the above-noted applications. Upon allowance of the claims but for the double patenting rejections, Applicant will provide arguments against the double patenting rejections and/or provide a terminal disclaimer.

G. Additional Comments

Favorable reconsideration is respectfully requested.

Applicant believes no fees are due in association with the filing of this document. If an extension of time is required, Applicant hereby requests the appropriate extension of time. If any fees are required, please appropriately charge those fees to Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C. Deposit Account Number 50-1505/5659-06700/EBM.

Respectfully submitted,

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Date: FEB 23, 2005

Amendments to the Drawings

The attached seven (7) sheets of formal drawings include changes to FIGS. 23a, 23b, 32, 44, 54, 55, 59, 60, and 63 approved by the Examiner. These sheets replace the original sheets including the same figures.

Attachment: 7 Replacement Sheets